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Nuclear

10 CFR 50.73

June 4, 2001

PSLTR: #01-0066

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

Dresden Nuclear Power Station, Unit 2  
Facility Operating License No. DPR-19  
NRC Docket No. 50-237

Subject: Licensee Event Report 2001-002-00, "Reactor Scram due to Reactor Recirculation Pump Trip"

Enclosed is Licensee Event Report 2001-002-00, "Reactor Scram due to Reactor Recirculation Pump Trip," for the Dresden Nuclear Power Station (DNPS). This condition is being reported pursuant to 10 CFR 50.73 (a)(2)(iv)(B), which requires the reporting of any event or condition that resulted in a manual or automatic actuation of the Reactor Protection System (RPS) including reactor scram or reactor trip.

The following actions were taken:

Tightened the loose connection in cubicle J-3 of MCC 26-1.

Revised the oil sampling program to sample for non-metallic particulate for all required components.

Revised modification walkdown procedure CC-AA-106 "Performance of Walkdowns and Control of Walkdown Information" to require a risk assessment for intrusive walkdowns on operating equipment

This correspondence contains the following new commitments:

Revise the Motor Control Center (MCC) bus and MCC cubicle model work orders, preventative maintenance work orders, and associated procedures to address tightening of the stationary terminal block female clips and wire terminations during bucket and bus maintenance.

Review and modify as necessary the foreign material exclusion (FME) procedures used on Reactor Recirculation (RR) Motor Generator (MG) Set coupler and cooler maintenance to strengthen controls.

IE22

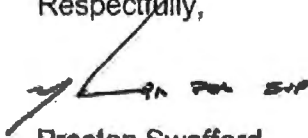
Install the auto start modification for the oil pumps in Unit 2 in the next refueling outage (i.e., D2R17).

Operations will institute the practice of periodically rotating equipment (pumps, coolers) on the reactor recirculation oil systems to ensure reliable operation.

Any other actions described in the submittal represent intended or planned actions by DNPS. They are described for the NRC's information and are not regulatory commitments.

If you have any questions, please contact Mr. Dale F. Ambler, Dresden Regulatory Assurance Manager at (815) 942-2920 extension, 3800.

Respectfully,

A handwritten signature in black ink, appearing to read "P. Swafford", is written over a diagonal line that extends from the "Respectfully," text.

Preston Swafford  
Site Vice President  
Dresden Nuclear Power Station

Enclosure

cc: Regional Administrator – NRC Region III  
NRC Senior Resident Inspector – Dresden Nuclear Power Station

## LICENSEE EVENT REPORT (LER)

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Information and Records Management Branch (t-6 f33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office Of Management And Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)

Dresden Nuclear Power Station, Unit 2

DOCKET NUMBER (2)

05000237

PAGE (3)

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TITLE (4)

Manual Reactor Scram due to Reactor Recirculation Pump Trip

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MON TH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
04	03	2001	2001	002	00	06	04	2001	N/A	N/A
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more) (11)							
1			20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)	
POWER LEVEL (10)			20.2203(a)(1)		20.2203(a)(3)(1)		50.73(a)(2)(ii)		50.73(a)(2)(x)	
031			20.2203(a)(2)(1)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71	
			20.2203(a)(2)(ii)		20.2203(a)(4)		X 50.73(a)(2)(iv)		OTHER	
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify In Abstract below or In NRC Form 366A	
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)			

## LICENSEE CONTACT FOR THIS LER (12)

NAME

Timothy P. Heisterman, Regulatory Assurance

TELEPHONE NUMBER (Include Area Code)

(815) 942-2920 Ext. 3324

## COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

## SUPPLEMENTAL REPORT EXPECTED (14)

YES		X NO		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
(If yes, complete EXPECTED SUBMISSION DATE)							

ABSTRACT (Limit to 1400 spaces, i. e., approximately 15 single-spaced typewritten lines) (16)

On April 3, 2001 at 2008 hours, the 2B Motor Generator (MG) Set tripped causing a 2B Reactor Recirculation (RR) pump trip due to a loose connection in the control circuit in the operating oil pump (2B1) Motor Control Center (MCC) cubicle. This resulted in the plant being placed in single loop operation with the 2A RR pump in service.

Approximately four hours after trip of the 2B MG Set, a bearing oil filter high differential pressure (dP) caused a trip of the 2A RR MG Set on low bearing header oil pressure. Operations observed the 2A breaker had tripped and manually inserted a reactor scram at 2358 hours per station procedures. The oil system was found to be contaminated with non-metallic particulate. An investigation of the MG Set oil system did not identify any material in the system design that could have been the cause of the contamination.

The root cause for the multiple trips of the MG Sets is the inadequate design of the system circuitry that does not provide for automatic starting of the non-operating (standby) oil pump when the running oil pump trips. Corrective actions to prevent recurrence include revising the MCC bus and MCC cubicle model work orders, preventative maintenance work orders, and associated procedures to address tightening of the stationary terminal block female clips and wire terminations during bucket and bus maintenance. Review and revise as necessary the FME procedures used on RR MG Set coupler and cooler maintenance to provide more rigorous controls, install the auto start modification for the oil pumps in Unit 2 in D2R17, and Operations to institute practice of periodically rotating equipment (pumps, coolers) on oil systems to ensure reliable operation, including comprehensive monitoring practices (pressure, flow, oil sampling, etc.) following equipment swaps.

The safety significance of this event has been determined to be minimal.

**LICENSEE EVENT REPORT (LER)**

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Dresden Nuclear Power Station, Unit 2	05000237	2001	002	00	2 OF 4

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

**PLANT AND SYSTEM IDENTIFICATION:**

General Electric – Boiling Water Reactor – 2527 MWt rated core thermal power  
Energy Industry Identification System (EIS) Codes are identified in the text as [XX] and are obtained from IEEE Standard 805-1984, IEEE Recommended Practice for System Identification in Nuclear Power Plants and Related Facilities.

**EVENT IDENTIFICATION:**

Manual Reactor Scram due to Reactor Recirculation Pump Trip

**A. PLANT CONDITIONS PRIOR TO EVENT:**

Unit: 2	Event Date: 04-03-2001	Event Time: 2358
Reactor Mode: 1	Mode Name: Power Operation	Power Level: 31%
Reactor Coolant System Pressure: 1000 psig		

**B. DESCRIPTION OF EVENT:**

This condition is being reported pursuant to 10 CFR 50.73 (a)(2)(iv)(B), which requires the reporting of any event or condition that resulted in a manual or automatic actuation of the Reactor Protection System (RPS) including reactor scram or reactor trip.

On April 3, 2001 at 2008 hours, the 2B Motor Generator (MG) Set tripped causing a 2B Reactor Recirculation (RR) [AD] pump trip due to a loose connection in the control circuit in the operating oil pump (2B1) Motor Control Center (MCC) cubicle. This resulted in the plant being placed in single loop operation with the 2A RR pump in service.

Approximately four hours after trip of the 2B MG Set, a bearing oil filter high differential pressure (dP) caused a trip of the 2A RR MG Set on low bearing header oil pressure. Operations observed the 2A breaker had tripped and manually inserted a reactor scram at 2358 hours in accordance with per station procedures. The oil system was found to be contaminated with non-metallic particulate. An investigation of the MG Set oil system did not identify any material in the system design that could have been the cause of the contamination.

The following is a description of the events leading to the manual scram of the Unit 2 reactor.

**2B MG Set Trip (Loss of 2B1 Oil Pump)**

The investigation of this event revealed that at Motor Control Center 26-1, cubicle J-3, the connection between the oil pump control wiring and the bucket stab was loose and caused the pump contactor to drop out when the Electrical Maintenance (EM) worker lifted the wire bundle.

Review of the PM work packages for the previous bus and cubicle maintenance, current model work orders for bus and cubicle maintenance, and referenced procedures concluded that verifying tightness of the terminations and female clips on the field terminal strip is not specifically required. The proximate Root Cause of this event was determined to be inadequate preventive maintenance practices, which resulted in the loose connection. Based on interviews of EM Department station personnel, it is considered within the "skill of the craft" to ensure the all terminations are tightened. The investigation determined that the terminal screws for the stationary block are not tightened during the 12-year bucket PM, but are to be tightened during the bus PM that occurs every six refueling outages.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

**2A RR MG Set Trip**

Four hours after trip of the 2B RR MG Set, and while the plant was in single loop operation, the 2A RR MG Set tripped on low bearing oil pressure. This resulted in the need for the operator to manually scram the reactor due to loss of both recirculation pumps tripping. The 2A1 oil pump remained in operation during this event. Following the trip of the 2A RR MG Set, it was confirmed that the bearing oil filters on the coupler between the MG set and the RR pump had an abnormally high dP, causing low pressure in the bearing oil header. This resulted in a trip of the MG Set.

Upon disassembly of the filters, it was discovered that they were clogged with particulate that was composed of 90 percent phenolic and 10 percent neoprene. This same material was also found in the 2A cooler that was online at the time of the event. A small amount of this material was found in the 2A1 pump. All materials installed in the oil system were reviewed to identify any component that could have been the source of this condition. No component within the RR MG Set oil system could be specifically confirmed as the source of the particulate material. The motor and generator bearings include phenolic insulators, but a specific match could not be confirmed. There are currently no observable indications of degraded system equipment that demonstrate failure of any subcomponent in the system. The specific source of the contamination is unknown. Foreign material could have been introduced during coupler maintenance, piping maintenance, cooler maintenance or inspection activities. Investigation into the processing of the MG Set oil did not identify specific evidence that this processing was the cause. There have been no reported problems with other equipment in the plant that use this oil. Although the specific source of the contamination is unknown, the most probable cause is foreign material from some prior activity. It was identified that the oil sampling program for 2A MG Set did not include testing for non-metallic particulate. There was no other reported oil contamination problems.

**C. CAUSE OF EVENT:**

The root cause of this event is summarized by a combination of two independent root causes based on the investigation following the unit manual scram.

**2B MG Set Trip (Loss of 2B1 Oil Pump)**

The root cause of the trip of the 2B MG Set with the 2B1 oil pump running was inadequate preventive maintenance practices that resulted in a loose connection. The lack of properly addressing the potential risk of walkdown activities on operating equipment was a factor.

**2A RR MG Set Trip**

The most probable root cause of the trip of the 2A MG Set was abnormally high bearing oil filter loading due to foreign material (non-metallic particulate contamination) in the oil.

**Systemic Root Causes**

The root cause of the multiple trips of the MG Sets is the inadequate design of the circuitry since it does not provide for the automatic starting of the standby oil pump when the running oil pump trips or the oil pressure is below the setpoint. The lack of this auto-start feature requires the plant to decrease power when one of the oil pumps trips. This deficiency was previously identified and the Auto-start Modification was installed on Unit 3. The modification walkdown for installation of the modification on Unit 2 is what initiated the 2B MG Set trip.

# LICENSEE EVENT REPORT (LER)

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

The root cause for the multiple issues with the oil systems is due to a lack of an appropriate equipment rotation program that ensures the reliability of all redundant components within the system. A review of the operating history of the Unit 2 oil pumps has shown that the 2A2/2B2 pumps have very low run times, since the normal alignment is the 2A1 and the 2B1 pumps. Although the 2B oil cooler was retubed in 1998, it was not used until late 2000. The 2B cooler may have been the source of the Foreign Material, since it was put into service for approximately 3 months prior to the filter clogging event. This operational philosophy affects the capability of the non-operating equipment to function adequately when required, e.g., pump 2B2.

## D. SAFETY ANALYSIS

At no time during this series of events was there any risk to the safe operation of the plant or to plant personnel. With exception of the abnormalities causing and contributing to the need for a manual scram, plant equipment response was in accordance with design and required no operator action. No safety systems were needed in response to this event with the exception of the expected automatic isolations designed to occur following a scram. Based upon this evaluation, the safety significance of this event has been determined to be minimal.

## E. CORRECTIVE ACTIONS:

Tighten the loose connection in cubicle J-3 of MCC 26-1(Complete)

Revised modification walkdown procedure CC-AA-106 "Performance of Walkdowns and Control of Walkdown Information" to require a risk assessment for intrusive walkdowns on operating equipment.  
(Complete)

Revise the oil sampling program to sample for non-metallic particulate for all required components. (Complete)

Revise the MCC bus and MCC cubicle model Work Orders (WO), PM W/O's, and associated procedures to address tightening of the stationary terminal block female clips and wire terminations during bucket and bus maintenance.  
(ATI 49196)

Review and modify as necessary the foreign material exclusion (FME) procedures used on Reactor Recirculation (RR) Motor Generator (MG) Set coupler and cooler maintenance to strengthen controls. (ATI 49196)

Install the auto start modification for the oil pumps in Unit 2 in the next refueling outage (i.e., D2R17).  
(ATI 49196)

Operations will institute the practice of periodically rotating equipment (pumps, coolers) on the reactor recirculation oil systems to ensure reliable operation, including comprehensive monitoring practices (pressure, flow, oil sampling) following equipment swaps. (ATI 49196)

## F. PREVIOUS OCCURRENCES:

None

## G. COMPONENT FAILURE DATA:

None